

This listing of claims will replace all prior versions, and listings, of claims in the application:

1 Claim 1 (currently amended): A multiband data communication
2 apparatus which receives signals by switching a plurality of
3 frequency bands in response to a band switching signal, said
4 multiband data communication apparatus comprising:

5 quadrature demodulating means for converting either a reception
6 signal or a reception intermediate frequency signal into a
7 quadrature reception baseband signal, said quadrature
8 demodulating means including:

9 a pair of first quadrature mixers for converting either the
10 reception signal or the reception intermediate frequency signal
11 into a reception baseband signal;

12 local oscillating means for producing a local oscillation
13 signal; and

14 phase shifting means for inputting said band switching
15 signal and for shifting a phase of said local oscillation signal
16 based upon said band switching signal to thereby supply the
17 phase-shifted local oscillation signal to one or both of said
18 pair of first quadrature mixers.

1 Claim 2 (previously presented): A multiband data
2 communication apparatus which transmits signals by switching a
3 plurality of frequency band in response to a band switching
4 signal, said multiband data communication apparatus comprising:

5 quadrature modulating means for converting a quadrature
6 transmission baseband signal into either a transmission signal
7 or a transmission intermediate frequency signal, said quadrature

modulating means including:

a pair of second quadrature mixers for converting a transmission baseband signal into either the transmission signal or the transmission intermediate frequency signal;

local oscillating means for producing a local oscillation signal; and

phase shifting means for shifting a phase of said local oscillation signal based upon said band switching signal to thereby supply the phase-shifted local oscillation signal to one or both of said pair of second quadrature mixers.

Claim 3 (previously presented): A multiband data communication apparatus comprising:

quadrature modulating means for converting a quadrature transmission baseband signal into either a transmission signal or a transmission intermediate frequency signal;

quadrature demodulating means for converting either a reception signal or a reception intermediate frequency signal into a quadrature reception baseband signal; and

local oscillation signal producing means for supplying a local oscillation signal to both said quadrature modulating means and said quadrature demodulating means, for transmitting/receiving by switching a plurality of frequency bands in response to a band switching signal,

wherein said quadrature demodulating means includes a pair of first quadrature mixers for converting either the reception signal or the reception intermediate frequency signal into a reception baseband signal; and wherein

said quadrature modulating means includes a pair of second

19 quadrature mixers for converting a transmission baseband signal
20 into either the transmission signal or the transmission
21 intermediate frequency signal; and further wherein

22 said local oscillation signal producing means includes local
23 oscillating means for producing a local oscillation signal, and
24 said apparatus further comprises

25 phase shifting means for shifting a phase of said local
26 oscillation signal based upon said band switching signal to
27 thereby supply the phase-shifted local oscillation signal to one
28 or both of said pair of first quadrature mixers and to one or
29 both of said pair of second quadrature mixers.

1 Claim 4 (previously presented): A multiband data
2 communication apparatus as claimed in claim 3, wherein said
3 phase shifting means supplies a signal obtained by shifting the
4 phase of said local oscillation signal by $\pi/2$ to one of said
5 pair of first quadrature mixers and one of said pair of second
6 quadrature mixers, while said phase shifting means supplies one
7 of said local oscillation signal and a signal obtained by
8 inverting a code of said local oscillation signal to the other
9 of said pair of first quadrature mixers and to the other of said
10 pair of second quadrature mixers in response to said band
11 switching signal.

1 Claim 5 (previously presented): A multiband data
2 communication apparatus as claimed in claim 3, wherein said phase
3 shifting means supplies said local oscillation signal to one of
4 said pair of first quadrature mixers and to one of said pair of
5 second quadrature mixers; while said phase shifting means

6 supplies one of a signal obtained by shifting the phase of said
7 local oscillation signal by $\pi/2$ and a signal obtained by
8 shifting the phase of said local oscillation signal by $\pi/2$ and
9 by then inverting said phase-shifted local oscillation signal to
10 the other mixer of said pair of first quadrature mixers and also
11 to the other mixer of said pair of second quadrature mixers in
12 response to said band switching signal.

1 Claim 6 (previously presented): A multiband data
2 communication apparatus as claimed in claim 3, wherein said phase
3 shifting means supplies said local oscillation signal to one of
4 said pair of first quadrature mixers and to one of said pair of
5 second quadrature mixers, while said phase shifting means
6 supplies one of a signal obtained by delaying the phase of said
7 local oscillation signal by $\pi/2$ and a signal obtained by
8 advancing the phase of said local oscillation signal by $\pi/2$ to
9 the other of said pair of first quadrature mixers and also to the
10 other of said pair of second quadrature mixers in response to
11 said band switching signal.

1 Claim 7 (previously presented): A multiband data
2 communication apparatus which receives signals by switching a
3 plurality of frequency bands in response to a band switching
4 signal, said multiband data communication apparatus comprising:

5 quadrature demodulating means for converting either a
6 reception signal or a reception intermediate frequency signal
7 into quadrature reception baseband signal, said quadrature
8 demodulating means including:

9 a pair of first quadrature mixers for converting either the

10 reception signal or the reception intermediate frequency signal
11 into a reception baseband signal;

12 storage means for saving thereinto discrete data a frequency
13 pattern component functioning as a base;

14 address generating means for generating an address every
15 preselected clock;

16 phase shift means for adding a predetermined number based
17 upon said band switching signal to said address;

18 first analog converting means for analog-converting data
19 which is read out by addressing said storage means based on the
20 address outputted from said address generating means to thereby
21 supply the analog-converted data to one of said pair of first
22 quadrature mixers; and

23 second analog converting means for analog-converting data
24 which is read out by addressing said storage means based on the
25 output of said phase shift means to thereby supply the analog-
26 converted data to the other of said pair of first quadrature
27 mixers.

1 Claim 8 (previously presented): A multiband data
2 communication apparatus which transmits signals by switching a
3 plurality of frequency band in response to a band switching
4 signal, said multiband data communication apparatus comprising:

5 quadrature modulating means for converting a quadrature
6 transmission baseband signal into either a transmission signal
7 or a transmission intermediate frequency signal, said quadrature
8 modulating means including:

9 a pair of second quadrature mixers for converting a
10 transmission baseband signal into either the transmission signal

11 or the transmission intermediate frequency signal;

12 storage means for saving thereinto discrete data of a
13 frequency pattern component functioning as a base address
14 generating means for generating an address every preselected
15 clock;

16 phase shift means for adding a predetermined number based
17 upon said band switching signal to said address;

18 first analog converting means for analog-converting data
19 which is read out by addressing said storage means based on the
20 address outputted from said address generating means to thereby
21 supply the analog-converted data to one of said pair of second
22 quadrature mixers; and

23 second analog converting means for analog-converting data
24 which is read out by addressing said storage means based on the
25 output of said phase shift means to thereby supply the analog-
26 converted data to the other of said pair of second quadrature
27 mixers.

1 Claim 9 (previously presented): A multiband data
2 communication apparatus comprising:

3 quadrature modulating means for converting a quadrature
4 transmission baseband signal into either a transmission signal
5 or a transmission intermediate frequency signal;

6 quadrature demodulating means for converting either a
7 reception signal or a reception intermediate frequency signal
8 into a quadrature reception baseband signal; and

9 local signal producing means for supplying a local
10 oscillation signal to both said quadrature modulating means and
11 said quadrature demodulating means, for transmitting/receiving

12 by switching a plurality of frequency bands in response to a band
13 switching signal, wherein

14 said quadrature demodulating means includes a pair of first
15 quadrature mixers for converting either the reception signal or
16 the reception intermediate frequency signal into a reception
17 baseband signal; and further wherein

18 said quadrature modulating means includes a pair of second
19 quadrature mixers for converting a transmission baseband signal
20 into either the transmission signal or the transmission
21 intermediate frequency signal; and still further wherein

22 said local oscillation signal producing means includes
23 storage means for saving thereinto discrete data of a frequency
24 pattern component functioning as a base; address generating means
25 for generating an address every preselected clock; phase shift
26 means for adding a predetermined number based upon said band
27 switching signal to said address; first analog converting means
28 for analog-converting data which is read out by addressing said
29 storage means based on the address outputted from said address
30 generating means to thereby supply the analog-converted data to
31 one of said pair of first quadrature mixers; and second analog
32 converting means for analog-converting data which is read out by
33 addressing said storage means based on the output of said phase
34 shift means to thereby supply the analog-converted data to the
35 other of said pair of first quadrature mixers.

1 Claim 10 (previously presented): A multiband data
2 communication apparatus as claimed in claim 9, wherein either
3 said quadrature modulating means or said local oscillation signal
4 producing means includes clock generating means for generating

5 a clock signal and interval determining means for determining a
6 clock interval used to read out data from said storage means so
7 as to control the address generating operation of said address
8 generating means.

1 Claim 11 (currently amended): A communication method of a
2 multiband data communication apparatus including quadrature
3 demodulating means for converting either a reception signal or
4 a reception intermediate frequency signal into a quadrature
5 reception baseband signal, for receiving by switching a plurality
6 of frequency bands in response to a band switching signal, said
7 communication method comprising the steps of:

8 producing a local oscillation signal;

9 providing said band switching signal to a means for shifting
10 a phase for controlling said means for shifting a phase and

11 using said means for shifting a phase for shifting a phase
12 of said local oscillation signal in response to said band
13 switching signal to thereby supply the phase-shifted local
14 oscillation signal to a first quadrature mixer for converting
15 either the reception signal or the reception intermediate
16 frequency signal into a reception baseband signal.

1 Claim 12 (previously presented): A communication method of
2 a multiband data communication apparatus including quadrature
3 modulating means for converting a quadrature transmission
4 baseband signal into either a transmission signal or a
5 transmission intermediate frequency signal, for transmitting by
6 switching a plurality of frequency band in response to a band
7 switching signal, said communication method comprising the steps

8 of:

9 producing a local oscillation signal; and
10 shifting a phase of said local oscillation signal in
11 response to said band switching signal to thereby supply the
12 phase-shifted local oscillation signal to a second quadrature
13 mixer for converting a transmission baseband signal into either
14 the transmission signal or the transmission intermediate
15 frequency signal.

1 Claim 13 (previously presented): A communication method of
2 a multiband data communication apparatus including quadrature
3 modulating means for converting a quadrature transmission
4 baseband signal into either a transmission signal or a
5 transmission intermediate frequency signal; and quadrature
6 demodulating means for converting either a reception signal or
7 a reception intermediate frequency signal into a quadrature
8 reception baseband signal wherein said apparatus transmits and
9 receives signals by switching a plurality of frequency bands in
10 response to a band switching signal, said communication method
11 comprising the steps of:

12 producing a local oscillation signal; and
13 shifting a phase of said local oscillation signal in
14 response to the band switching signal to thereby supply the
15 phase-shifted local oscillation signal to one or both of a first
16 quadrature mixer and a second quadrature mixer, said first
17 quadrature mixer converting either the reception signal or the
18 reception intermediate frequency signal into a reception baseband
19 signal, and said second quadrature mixer converting a
20 transmission baseband signal into either the transmission signal

21 or the transmission intermediate frequency signal.

1 Claim 14 (previously presented): A communication method of
2 a multiband data communication apparatus as claimed in claim 13,
3 wherein said phase shifting step includes:

4 a first supplying step for supplying a signal which is
5 obtained by shifting the phase of said local oscillation signal
6 by $\pi/2$ to one of said first quadrature mixer and said second
7 quadrature mixer;

8 an inverting step for inverting a code of said local
9 oscillation signal; and

10 a second supplying step for supplying one of said local
11 oscillation signal and the output signal of said inverting step
12 to the other of said first quadrature mixer and said second
13 quadrature mixer in response to said band switching signal.

1 Claim 15 (previously presented): A communication method of
2 a multiband data communication apparatus as claimed in claim 13,
3 wherein said phase shifting step includes:

4 a first supplying step for supplying said local oscillation
5 signal to one of said first quadrature mixer and said second
6 quadrature mixer;

7 a phase shifting step for shifting the phase of said local
8 oscillation signal by $\pi/2$;

9 an inverting step for inverting a code of said output signal
10 of said phase shifting step; and

11 a second supplying step for supplying one of said output
12 signal of said phase shifting step and the output signal of said
13 inverting step to the other of said first quadrature mixer and

14 said second quadrature mixer in response to said band switching
15 signal.

1 Claim 16 (previously presented): A communication method of
2 a multiband data communication apparatus as claimed in claim 13,
3 wherein said phase shifting step includes:

4 a first supplying step for supplying said local oscillation
5 signal to one of said first quadrature mixer and said second
6 quadrature mixer;

7 a phase delaying step for delaying the phase of said local
8 oscillation signal by $\pi/2$;

9 a phase advancing step for advancing the phase of said local
10 oscillation signal by $\pi/2$; and

11 a second supplying step for supplying one of the output
12 signal of said phase delaying step and the output signal of said
13 phase advancing step to the other of said first quadrature mixer
14 and said second quadrature mixer in response to said band
15 switching signal.

1 Claim 17 (previously presented): A communication method of
2 a multiband data communication apparatus including quadrature
3 demodulating means for converting either a reception signal or
4 a reception intermediate frequency signal into a quadrature
5 reception baseband signal, for receiving by switching a plurality
6 of frequency bands in response to a band switching signal, said
7 communication method comprising:

8 a storing step for saving discrete data of a frequency
9 pattern component functioning as a base;

10 an address generating step for generating an address every

11 preselected clock signal;
12 a phase shifting step for adding a predetermined number
13 based upon said band switching signal to said address;
14 a first analog converting step for analog-converting data
15 which is read out by addressing said storing step based on the
16 address outputted from said address generating step to thereby
17 supply the analog-converted data to one of a pair of first
18 quadrature mixers for converting either the reception signal or
19 the reception intermediate frequency signal into a reception
20 baseband signal; and
21 a second analog converting step for analog-converting data
22 which is read out by addressing said storing step based on the
23 output of said phase shifting step to thereby supply the analog-
24 converted data to the other of said first quadrature mixers.

1 Claim 18 (previously presented): A communication method of
2 a multiband data communication apparatus including quadrature
3 modulating means for converting a quadrature transmission
4 baseband signal into either a transmission signal or a
5 transmission intermediate frequency signal, for transmitting by
6 switching a plurality of frequency band in response to a band
7 switching signal, said communication method comprising:

8 a storing step for saving discrete data of a frequency
9 pattern component functioning as a base;

10 an address generating step for generating an address every
11 preselected clock signal;

12 a phase shifting step for adding a predetermined number
13 based upon said band switching signal to said address;

14 a first analog converting step for analog-converting data

15 which is read out by addressing said storing step based on the
16 address outputted from said address generating step to thereby
17 supply the analog-converted data to one of a pair of second
18 quadrature mixers for converting a transmission baseband signal
19 into either the transmission signal or the transmission
20 intermediate frequency signal; and

21 a second analog converting step for analog-converting data
22 which is read out by addressing said storing step based on the
23 output of said phase shifting step to thereby supply the analog-
24 converted data to the other of said second quadrature mixers.

1 Claim 19 (previously presented): A communication method of
2 a multiband data communication apparatus including quadrature
3 modulating means for converting a quadrature transmission
4 baseband signal into either a transmission signal or a
5 transmission intermediate frequency signal; and quadrature
6 demodulating means for converting either a reception signal or
7 a reception intermediate frequency signal into a quadrature
8 reception baseband signal; and for transmitting/receiving by
9 switching a plurality of frequency bands in response to a band
10 switching signal, said communication method comprising:

11 a storing step for saving discrete data of a frequency
12 pattern component functioning as a base;

13 an address generating step for generating an address every
14 preselected clock signal;

15 a phase shifting step for adding a predetermined number
16 based upon said band switching signal to said address;

17 a first analog converting step for analog-converting data
18 which is read out by addressing said storing step based on the

19 address outputted from said address generating step to thereby
20 supply the analog-converted data to one of a first quadrature
21 mixer and a second quadrature mixer, said first quadrature mixer
22 converting either the reception signal or the reception
23 intermediate frequency signal into a reception baseband signal,
24 and said second quadrature mixer converting a transmission
25 baseband signal into either the transmission signal or the
26 transmission intermediate frequency signal; and

27 a second analog converting step for analog-converting data
28 which is read out by addressing said storing step based on the
29 output of said phase shifting step to thereby supply the analog-
30 converted data to the other of said first quadrature mixer and
31 said second quadrature mixer.

1 Claim 20 (original): A storage medium for storing thereinto
2 a computer readable program used to execute the communication
3 method of the multiband data communication apparatus as recited
4 in claim 11, 12, 13, 14, 15, 16, 17, 18, or 19.

1 Claim 21 (previously presented): A multiband data
2 communication apparatus which receives signals by switching a
3 plurality of frequency bands in response to a band switching
4 signal, said multiband data communication apparatus comprising:

5 quadrature demodulating means for converting either a
6 reception signal or a reception intermediate frequency signal
7 into a quadrature reception baseband signal, said quadrature
8 demodulating means including:

9 a pair of first quadrature mixers for converting either the
10 reception signal or the reception intermediate frequency signal

11 into a reception baseband signal;
12 local oscillating means for producing a local oscillation
13 signal;
14 phase shifting means for shifting a phase of said local
15 oscillation signal for input to one of said pair of first
16 quadrature mixers; and
17 means for optionally changing a phase of said local
18 oscillation signal for input to another of said pair of first
19 quadrature mixers based upon said band switching signal to
20 thereby ensure correct polarities of quadrature components of
21 said reception baseband signal.

1 Claim 22 (currently amended): A multiband data communication
2 apparatus which receives signals by switching a plurality of
3 frequency bands in response to a band switching signal, said
4 multiband data communication apparatus comprising:

5 quadrature demodulating means for converting either a
6 reception signal or a reception intermediate frequency signal
7 into a quadrature reception baseband signal, said quadrature
8 demodulating means including:

9 a pair of first quadrature mixers for converting either the
10 reception signal or the reception intermediate frequency signal
11 into a reception baseband signal;

12 local oscillating means for producing a local oscillation
13 signal; and

14 phase shifting means for inputting said band switching
15 signal for shifting a phase of said local oscillation signal to
16 ensure consistent polarities of quadrature components of said
17 reception baseband signal irrespective of an operating band of

18 the apparatus.

1 Claim 23 (previously presented): A multiband data
2 communication apparatus as claimed in claim 1, wherein said phase
3 shifting means supplies a signal obtained by shifting the phase
4 of said local oscillation signal by $\pi/2$ to one of said pair of
5 first quadrature mixers, while said phase shifting means supplies
6 one of said local oscillation signal and a signal obtained by
7 inverting a code of said local oscillation signal to the other
8 of said pair of first quadrature mixers in response to said band
9 switching signal.

1 Claim 24 (previously presented): A multiband data
2 communication apparatus as claimed in claim 1, wherein said phase
3 shifting means supplies said local oscillation signal to one of
4 said pair of first quadrature mixers while said phase shifting
5 means supplies one of a signal obtained by shifting the phase of
6 said local oscillation signal by $\pi/2$ and a signal obtained by
7 shifting the phase of said local oscillation signal by $\pi/2$ and
8 then inverting said phase-shifted local oscillation signal to the
9 other mixer of said pair of first quadrature mixers in response
10 to said band switching signal.

1 Claim 25 (previously presented): A multiband data
2 communication apparatus as claimed in claim 1, wherein said phase
3 shifting means supplies said local oscillation signal to one of
4 said pair of first quadrature mixers, while said phase shifting
5 means supplies one of a signal obtained by delaying the phase of
6 said local oscillation signal by $\pi/2$ and a signal obtained by

7 advancing the phase of said local oscillation signal by $\pi/2$ to
8 the other of said pair of first quadrature mixers in response to
9 said band switching signal.

1 Claim 26 (previously presented): A multiband data
2 communication apparatus as claimed in claim 2, wherein said phase
3 shifting means supplies a signal obtained by shifting the phase
4 of said local oscillation signal by $\pi/2$ to one of said pair of
5 second quadrature mixers, while said phase shifting means
6 supplies one of said local oscillation signal and a signal
7 obtained by inverting a code of said local oscillation signal to
8 the other of said pair of second quadrature mixers in response
9 to said band switching signal.

1 Claim 27 (previously presented): A multiband data
2 communication apparatus as claimed in claim 2, wherein said phase
3 shifting means supplies said local oscillation signal to one of
4 said pair of second quadrature mixers while said phase shifting
5 means supplies one of a signal obtained by shifting the phase of
6 said local oscillation signal by $\pi/2$ and a signal obtained by
7 shifting the phase of said local oscillation signal by $\pi/2$ and
8 then inverting said phase-shifted local oscillation signal to the
9 other mixer of said pair of second quadrature mixers in response
10 to said band switching signal.

1 Claim 28 (previously presented): A multiband data
2 communication apparatus as claimed in claim 2, wherein said phase
3 shifting means supplies said local oscillation signal to one of

4 said pair of second quadrature mixers, while said phase shifting
5 means supplies one of a signal obtained by delaying the phase of
6 said local oscillation signal by $\pi/2$ and a signal obtained by
7 advancing the phase of said local oscillation signal by $\pi/2$ to
8 the other of said pair of second quadrature mixers in response
9 to said band switching signal.

1 Claim 29 (currently amended): A multiband data communication
2 apparatus as claimed in claim 7, wherein either said quadrature
3 demodulating means includes clock generating means for generating
4 a clock signal and interval determining means for determining a
5 clock interval used to read out data from said storage means so
6 as to control the address generating operation of said address
7 generating means.

1 Claim 30 (previously presented): A multiband data
2 communication apparatus as claimed in claim 8, wherein either
3 said quadrature modulating means includes clock generating means
4 for generating a clock signal and interval determining means for
5 determining a clock interval used to read out data from said
6 storage means so as to control the address generating operation
7 of said address generating means.